

# Saturated Buffers: Beyond the Drawing Board

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# Introduction – Ecosystem Services Exchange

- Founded in 2010 with the goal of developing market-based solutions to water quality issues
- Plan Drainage Water Management and Subsurface Irrigation systems
- Developing nutrient trading markets in the Midwest
- Certified Technical Service Provider for the NRCS

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**MANAGE WATER. HARVEST RESULTS.**

**DONATE NOW**

- Industry-led organization addressing water quality and drainage concerns
- Work with USDA and universities on research and development of new technologies
- Provide training workshops to farmers and contractors

We live and work in a  
drained landscape.

...

How do we help our local landowners  
become better at managing their water  
and improving its quality?

# Give them better tools.



# Saturated Buffers

...

A new tool for improving water quality

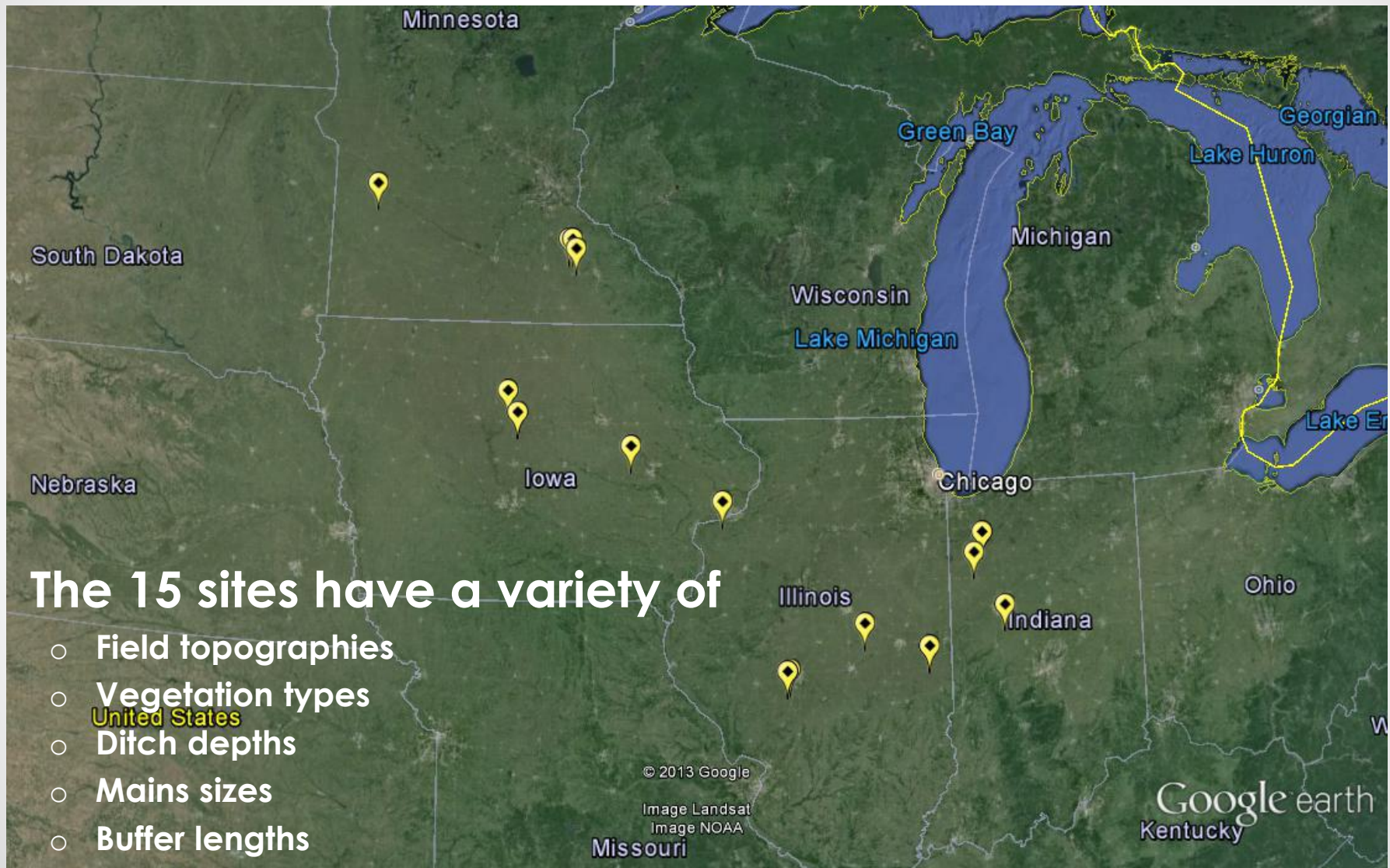


# Saturated Buffer Demonstration Project

- ADMC was awarded a 3-year grant from the NRCS
  - Indiana, Illinois, Iowa and Minnesota
  - Nine sites
- FSA awarded additional funds
  - Six additional sites



# Saturated Buffer Demonstration Project



The 15 sites have a variety of

- Field topographies
- Vegetation types
- Ditch depths
- Mains sizes
- Buffer lengths



# Saturated Buffer Demonstration Project

- We are monitoring
  - Flow
  - Water Quality (N and P)
  - Soil Parameters
  - Stream bank movement



# Flow Monitoring - Method

- 3-Chambered structure
  - Flow from field
  - Bypass flow
- Use structure as a weir
  - V-Notch stop logs
  - Level measured with ultra-sonic sensor



# Water Quality

- Bi-monthly grab samples
- Collected at structure
- 3 or 4 groundwater well transects
- Shipped same-day to Ames, IA for analysis
- Both N and P are being monitored







# Soil Parameters

- 4 ft soil cores collected at all sites
- Determined soil texture and baseline Phosphorus and Organic Carbon
- Re-sample in 2015 to check for changes





# Stream bank Movement

- Concern that increased movement of water in the subsoil will cause bank instability
- Intensive survey of ditch transects at four sites at the start of the project
- Same transects will be re-surveyed in 2015 to capture any movement



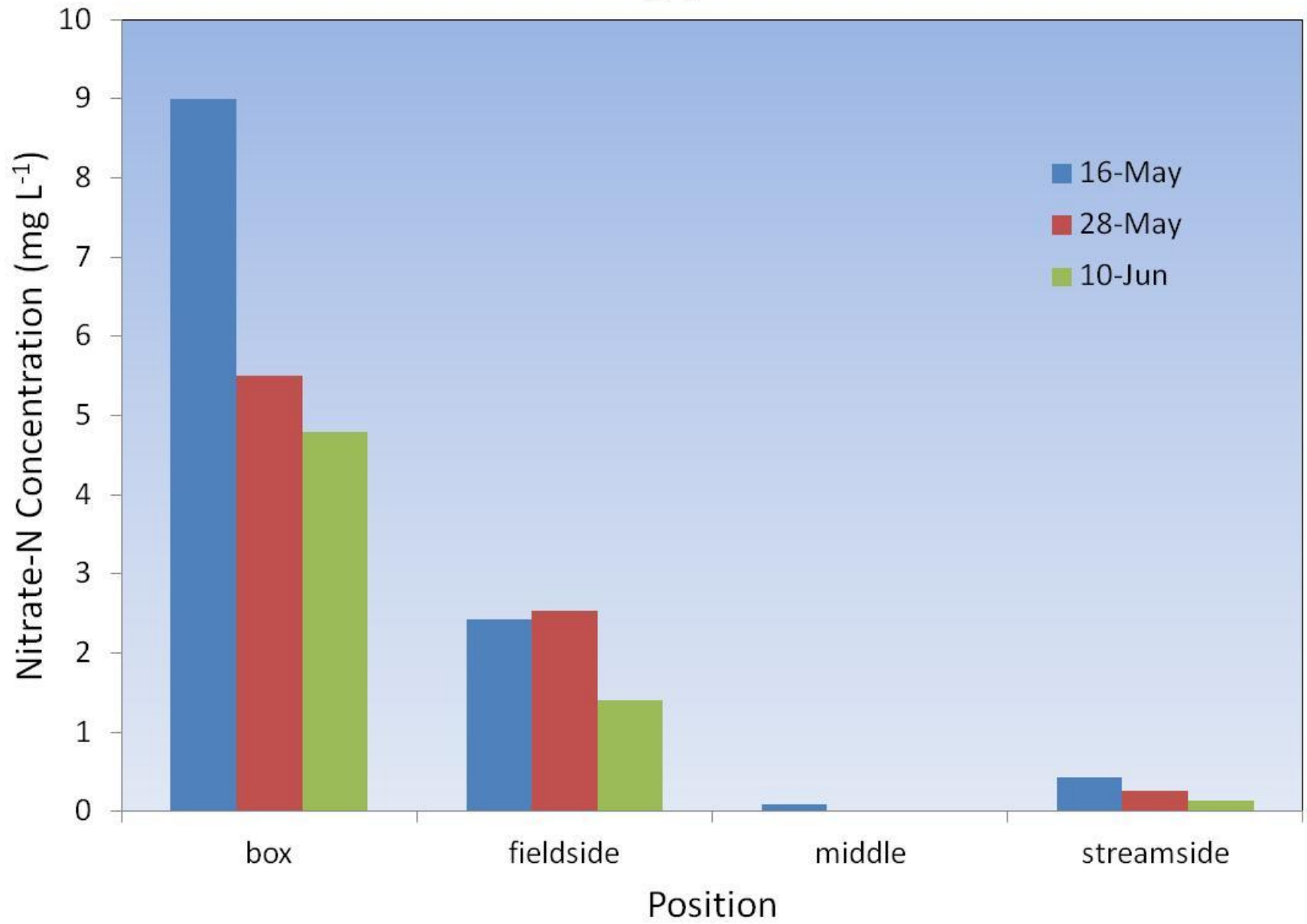
What are the results so far?

...

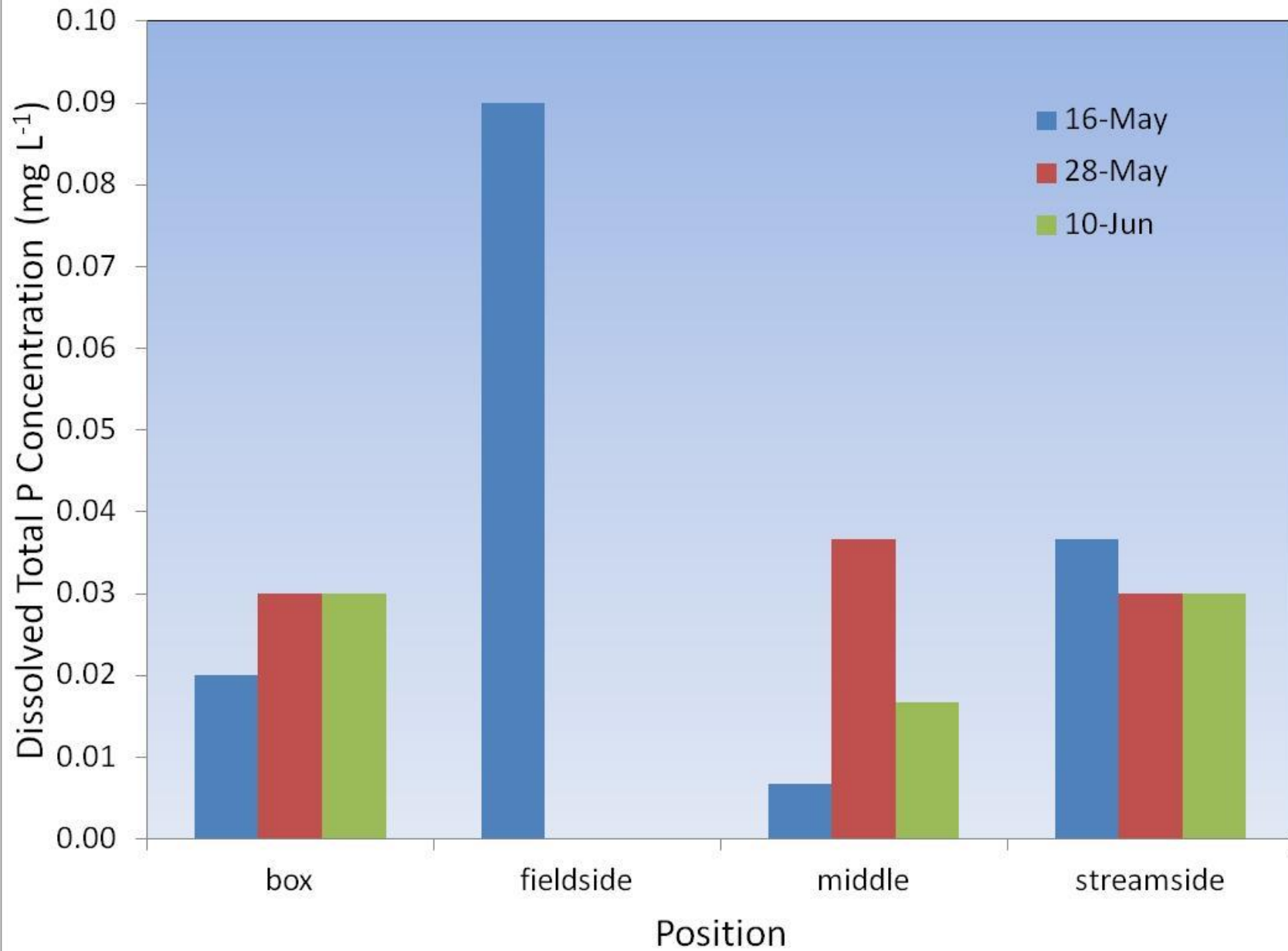
# Currently Compiling 2014 Data

- Flow data is being processed
- Water samples are being run in the lab
- Soil sampling results are back from the lab and under review

## IL-2

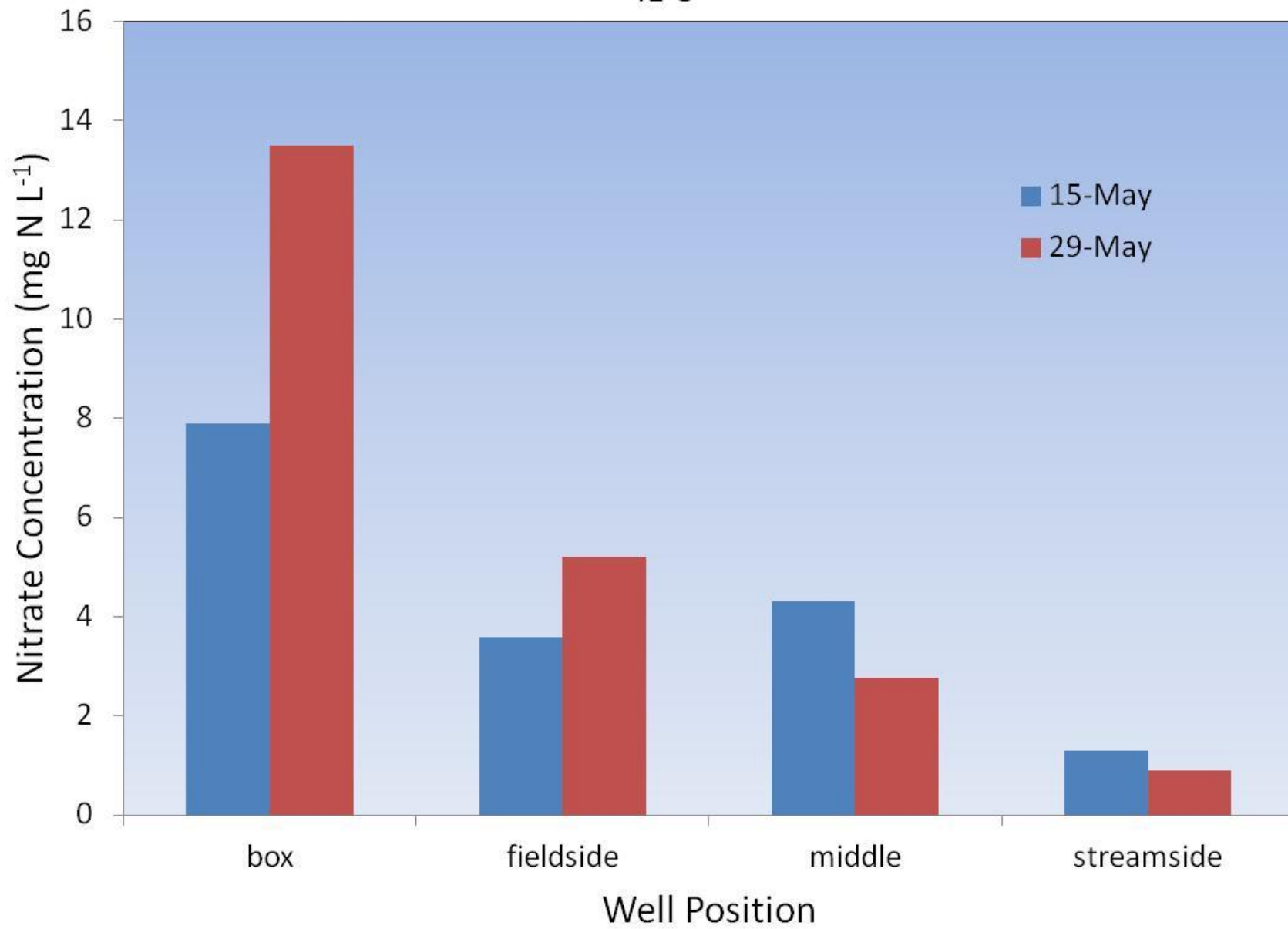


## IL-2

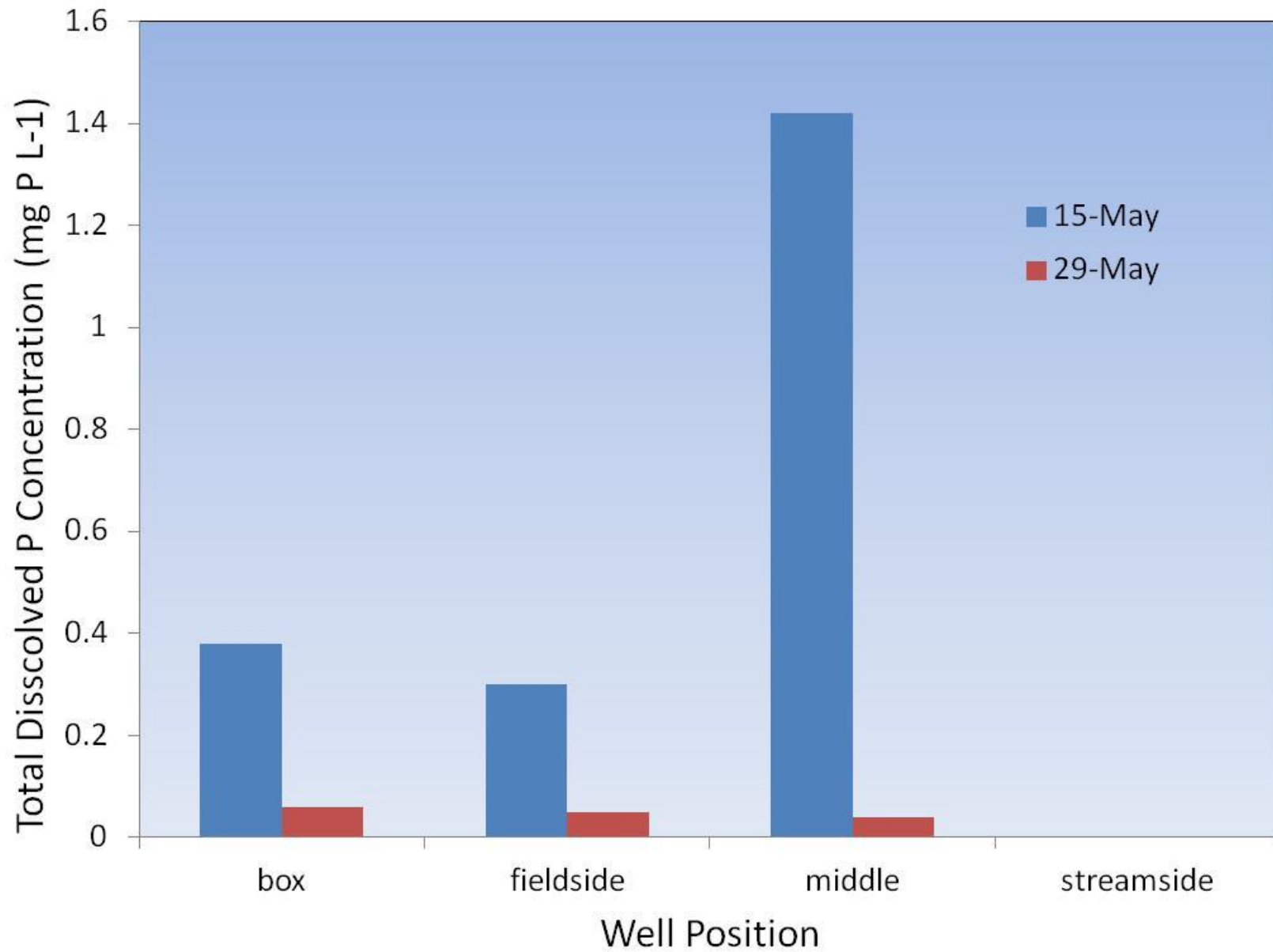




IL-3



### IL-3



What should I look for when  
choosing a saturated buffer site?

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# What does the site need to be like?

- Most important site requirements
  1. Buffer strip – grass, trees, etc.
  2. Tile main to intercept
  3. Hydraulic gradient – someplace for the water to go
- Other important factors
  - Soil conditions
  - Buffer dimensions/topography
  - Field Topography

# Soil Conditions

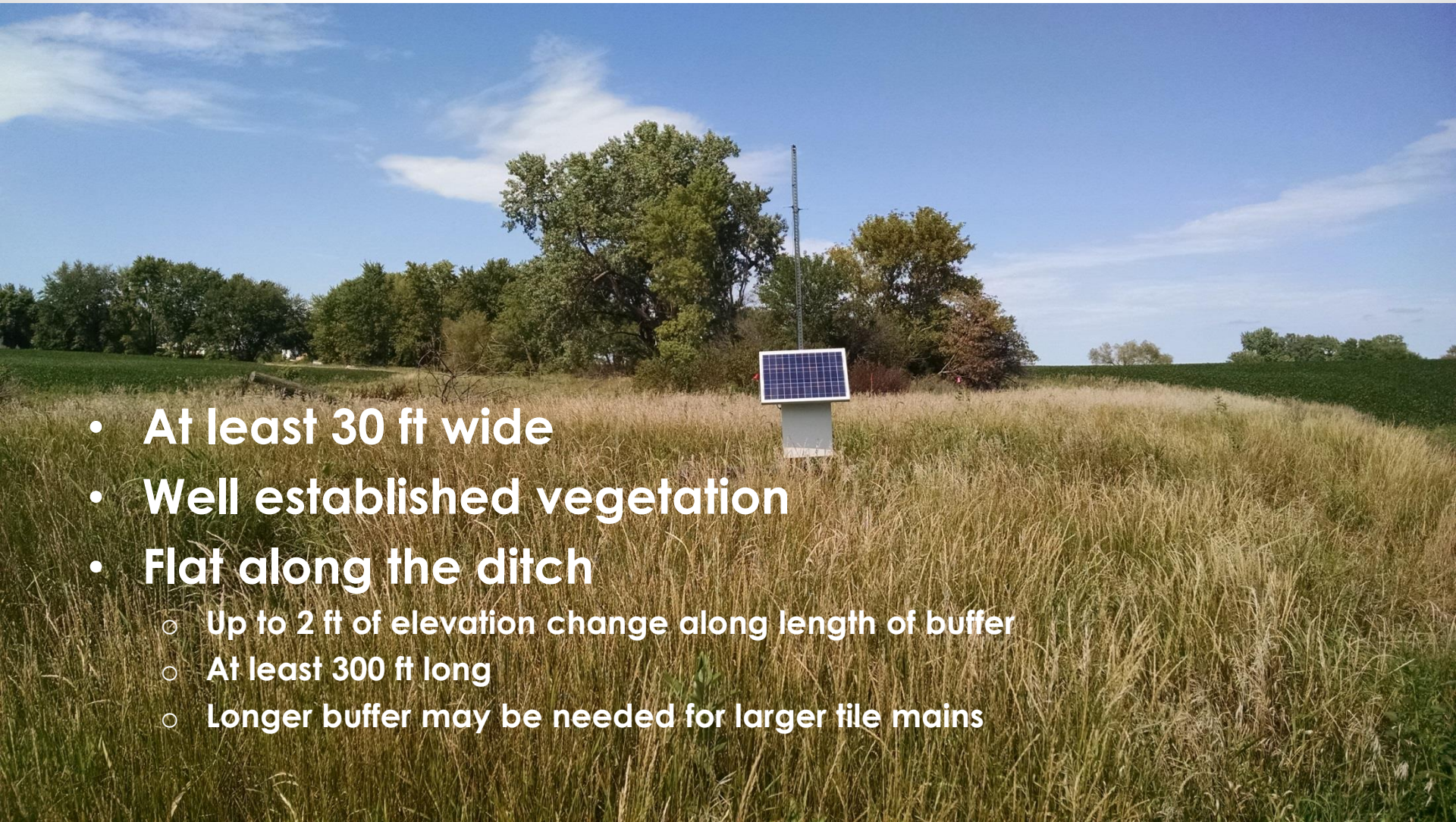
- Soil must allow you to maintain a high water table
  - Restrictive layer
  - Avoid sand/gravel lens



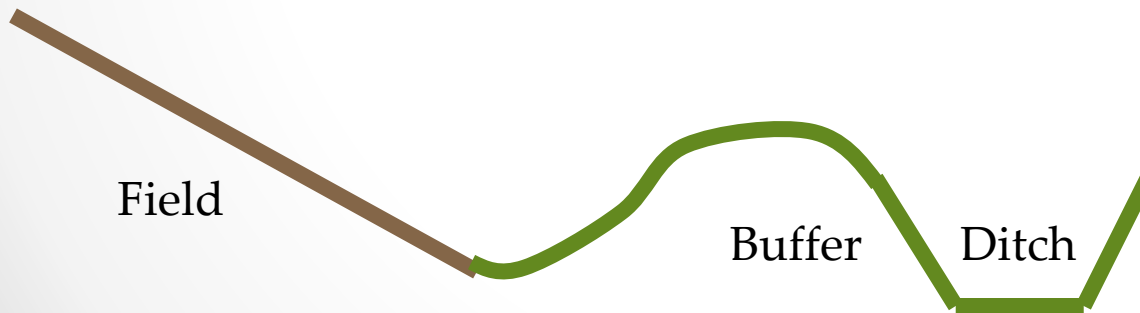
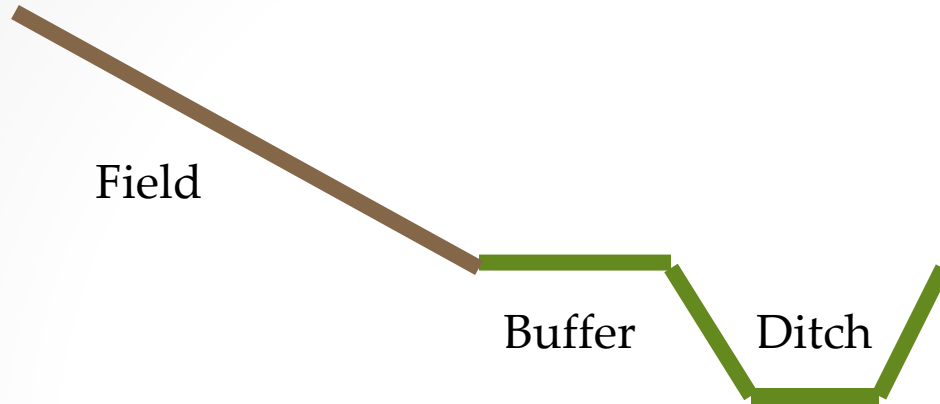


# Buffer Characteristics

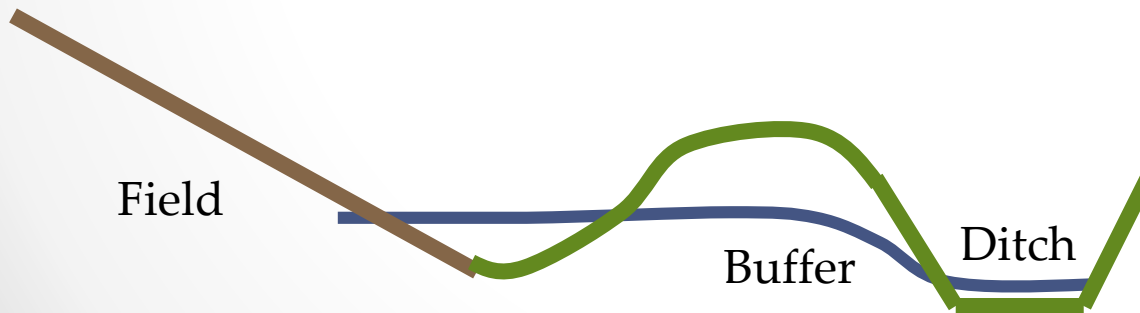
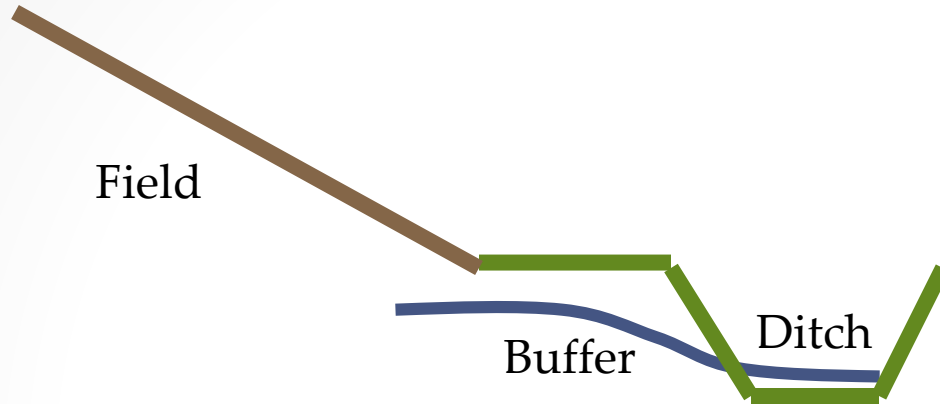
- At least 30 ft wide
- Well established vegetation
- Flat along the ditch
  - Up to 2 ft of elevation change along length of buffer
  - At least 300 ft long
  - Longer buffer may be needed for larger tile mains



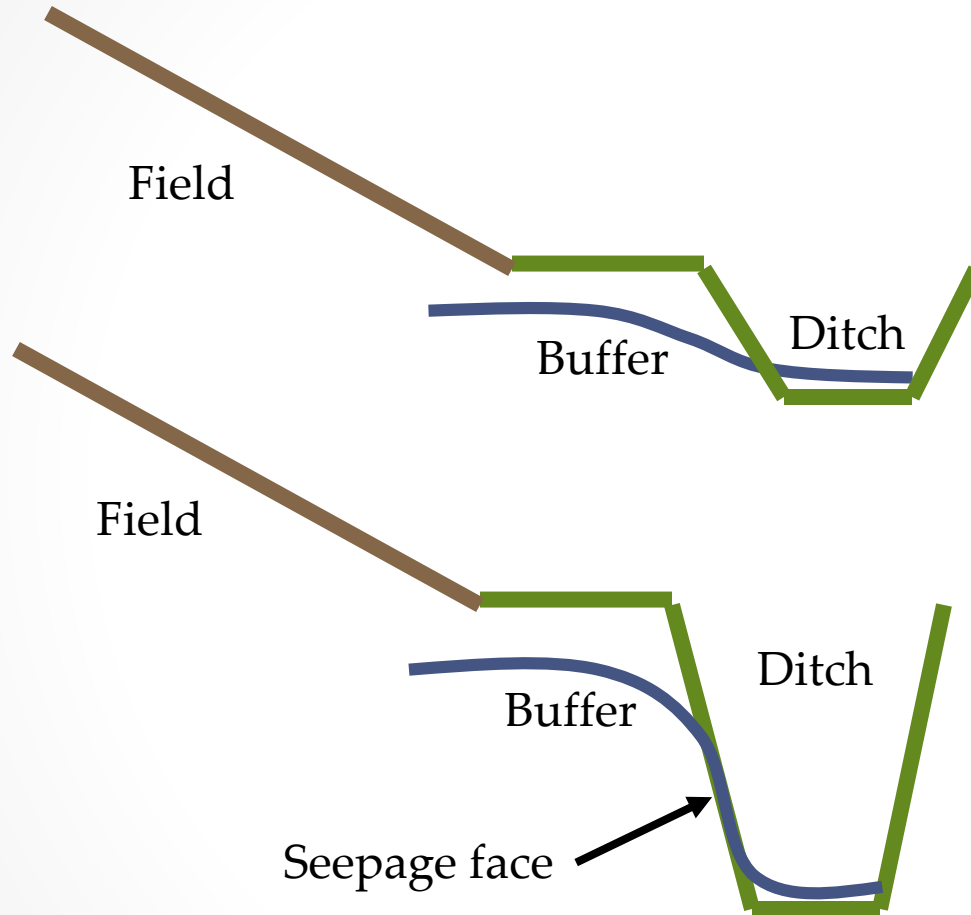
# Field Topography



# Field Topography



# Another Consideration – Ditch Depth





# Interim NRCS Practice Standard 739

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Vegetated Subsurface Drain Outlet



# Practice 739 - Definition

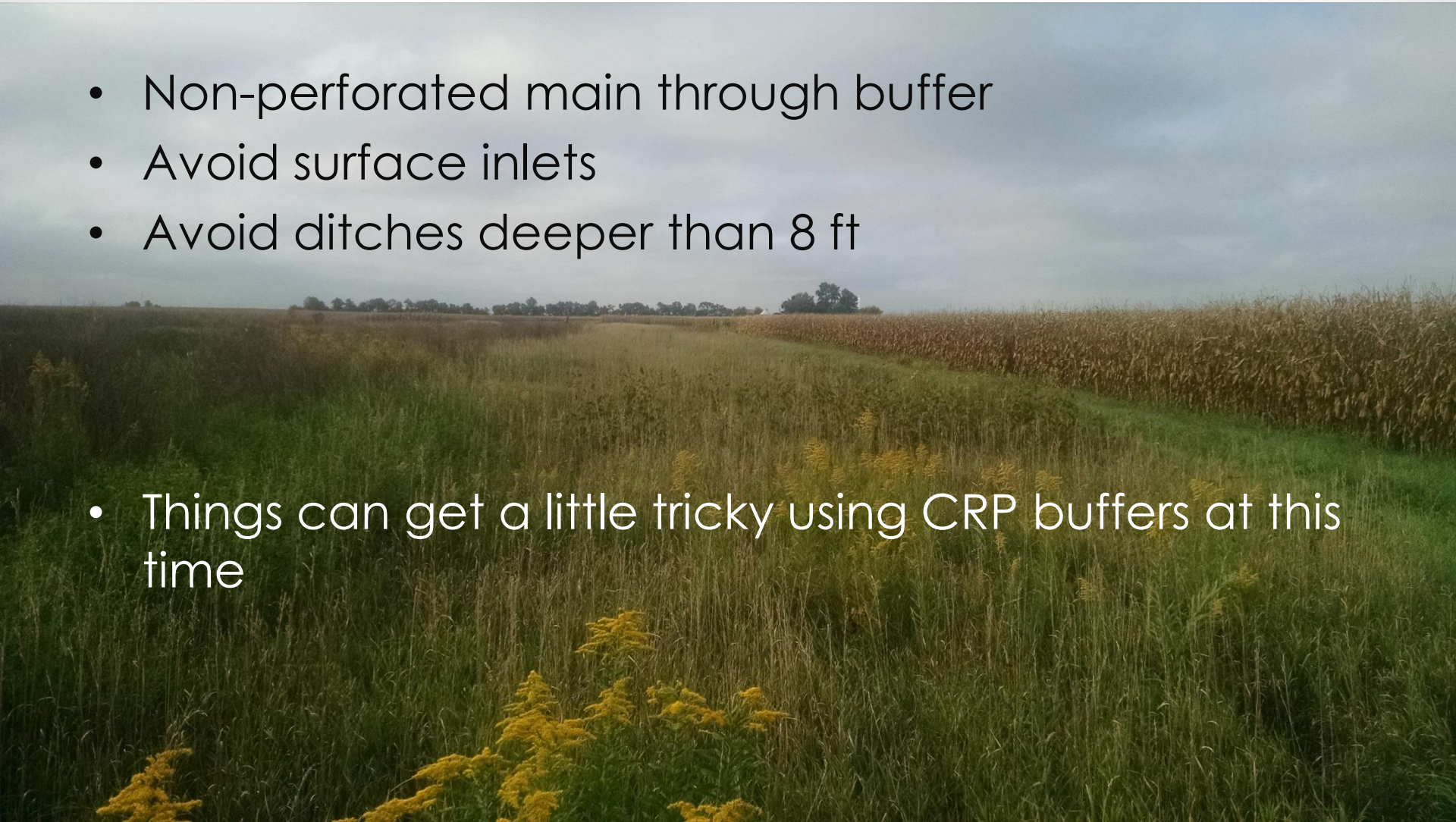
- A water control structure and subsurface distribution pipe capable of diverting drainage system discharge to create an elevated zone of soil saturation.
- The standard intentionally does not say that the system needs to outlet into a ditch or creek

# Applicable conditions

- This practice is applicable to agricultural lands with subsurface agricultural drainage systems that can be adapted to allow management of drainage discharges.
- This practice can be applied where the soils and topography are capable of maintaining a raised water table without adverse effects to channel banks, shorelines, or adjacent land.
- This practice shall not be used to treat septic system discharge or animal waste.

# Other Considerations

- Non-perforated main through buffer
  - Avoid surface inlets
  - Avoid ditches deeper than 8 ft
- 
- Things can get a little tricky using CRP buffers at this time



Super! Now what do I  
need to put one in?  
...



# Initial site review and design





# Proper equipment





# Control structure





# Pipe





# Ready to install



# Conclusions

- Saturated buffers are a cost effective tool for improving water quality
- Simple to design, install, and maintain
- Tremendous potential for broad implementation



# Questions?



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